# BOXER-8658AI

AI@Edge Fanless PoE Embedded AI System
with NVIDIA® Jetson Orin™ NX

User's Manual 2nd Ed

*Last Updated: October 18, 2024*

## Copyright Notice

## Acknowledgements

## Packing List

Before setting up your product, please make sure the following items have been shipped:

| Item | Quantity |
|---|---|
| ● BOXER-8658AI | 1 |
| ● Wallmount Bracket | 2 |
| ● Screw Package | 1 |
| ● Power Connector | 1 |
| ● Power Adapter (Optional) | 1 |
| ● Power Cord (Optional) | 1 |

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

## About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

## Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. All cables and adapters supplied by AAEON are certified and in accordance with the material safety laws and regulations of the country of sale. Do not use any cables or adapters not supplied by AAEON to prevent system malfunction or fires.
3. Make sure the power source matches the power rating of the device.
4. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
5. Always completely disconnect the power before working on the system's hardware.
6. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
7. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
8. Always disconnect this device from any power supply before cleaning.
9. While cleaning, use a damp cloth instead of liquid or spray detergents.
10. Make sure the device is installed near a power outlet and is easily accessible.
11. Keep this device away from humidity.
12. Place the device on a solid surface during installation to prevent falls
13. Do not cover the openings on the device to ensure optimal heat dissipation.
14. Watch out for high temperatures when the system is running.
15. Do not touch the heat sink or heat spreader when the system is running
16. Never pour any liquid into the openings. This could cause fire or electric shock.

17. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

18. If any of the following situations arises, please the contact our service personnel:

    i. Damaged power cord or plug
    ii. Liquid intrusion to the device
    iii. Exposure to moisture
    iv. Device is not working as expected or in a manner as described in this manual
    v. The device is dropped or damaged
    vi. Any obvious signs of damage displayed on the device

19. DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.

## FCC Statement


This device complies with Part 15 FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

*Caution:*

*There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.*

*Attention:*

*Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte.*
*Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur.*
*Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.*

China RoHS Requirements (CN)

## 产品中有毒有害物质或元素名称及含量

AAEON System QO4-381 Rev.A0

| 部件名称 | 有毒有害物质或元素 | | | | | |
|---|---|---|---|---|---|---|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚(PBDE) |
| 印刷电路板及其电子组件 | × | ○ | ○ | ○ | ○ | ○ |
| 外部信号连接器及线材 | × | ○ | ○ | ○ | ○ | ○ |
| 外壳 | ○ | ○ | ○ | ○ | ○ | ○ |
| 中央处理器与内存 | × | ○ | ○ | ○ | ○ | ○ |
| 硬盘 | × | ○ | ○ | ○ | ○ | ○ |
| 液晶模块 | × | × | ○ | ○ | ○ | ○ |
| 光驱 | × | ○ | ○ | ○ | ○ | ○ |
| 触控模块 | × | ○ | ○ | ○ | ○ | ○ |
| 电源 | × | ○ | ○ | ○ | ○ | ○ |
| 电池 | × | ○ | ○ | ○ | ○ | ○ |

本表格依据 SJ/T 11364 的规定编制。

○：表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572标准规定的限量要求以下。

×：表示该有害物质的某一均质材料超出了GB/T 26572的限量要求，然而该部件仍符合欧盟指令2011/65/EU 的规范。

备注：

一、此产品所标示之环保使用期限，系指在一般正常使用状况下。

二、上述部件物质中央处理器、内存、硬盘、光驱、电源为选购品。

三、上述部件物质液晶模块、触控模块仅一体机产品适用。

China RoHS Requirement (EN)

## Hazardous and Toxic Materials List

AAEON System QO4-381 Rev.A0

| Component Name | Hazardous or Toxic Materials or Elements | | | | | |
|---|---|---|---|---|---|---|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr(VI)) | Polybrominated biphenyls (PBBs) | Polybrominated diphenyl ethers (PBDEs) |
| PCB and Components | X | O | O | O | O | O |
| Wires & Connectors for Ext.Connections | X | O | O | O | O | O |
| Chassis | O | O | O | O | O | O |
| CPU & RAM | X | O | O | O | O | O |
| HDD Drive | X | O | O | O | O | O |
| LCD Module | X | X | O | O | O | O |
| Optical Drive | X | O | O | O | O | O |
| Touch Control Module | X | O | O | O | O | O |
| PSU | X | O | O | O | O | O |
| Battery | X | O | O | O | O | O |

This form is prepared in compliance with the provisions of SJ/T 11364.

O: The level of toxic or hazardous materials present in this component and its parts is below the limit specified by GB/T 26572.

X: The level of toxic of hazardous materials present in the component exceed the limits specified by GB/T 26572, but is still in compliance with EU Directive 2011/65/EU (RoHS 2).

Notes:

1. The Environment Friendly Use Period indicated by labelling on this product is applicable only to use under normal conditions.
2. Individual components including the CPU, RAM/memory, HDD, optical drive, and PSU are optional.
3. LCD Module and Touch Control Module only applies to certain products which feature these components.

# Table of Contents

# Chapter 1

Product Specifications

## 1.1 Specifications

| System | |
|---|---|
| AI Accelerator | NVIDIA® Jetson Orin™ NX |
| CPU | NVIDIA® Jetson Orin™ NX 8GB:<br>6-core Arm® Cortex®-A78AE v8.2 64-bit CPU<br>NVIDIA® Jetson Orin™ NX 16GB:<br>8-core Arm® Cortex®-A78AE v8.2 64-bit CPU |
| System Memory | 8GB LPDDR5<br>16GB LPDDR5 |
| Storage Device | 2.5" SATA Drive Bay x 1<br>M.2 2280 M-Key x 1 (NVMe) |
| Display Interface | HDMI 2.0 (Type-A) x 1 |
| Ethernet | RJ-45 x 8 for GbE PoE/PSE (802.3af/at, Max: 120W)<br>System supports total 120W PoE when input voltage is at or over 24V.<br>System supports total 80W PoE when input voltage is between 12~24V.<br>System supports total 30W PoE when input voltage is below 12V.<br>RJ-45 x 2 for Giga LAN |
| I/O | USB 3.2 Gen 2 (Type-A) x 4<br>DB-9 x 1 for CANBus FD x 1<br>DB-15 x 1 for RS-232/422/485 x 1 and DIO x 8<br>Line Out x 1<br>Micro USB x 1 for OS Flash<br>Power Button x 1<br>Recovery Button x 1 |

## System

| | |
|---|---|
| I/O Cont. | Switch x 2 for ACC Ignition Delay On/Off |
| | Antenna x 7 |
| | TPM Support, GNSS Support, 9-Axis Sensor Support |
| Expansion | M.2 2230 E-Key x 1 (Wi-Fi/BT) |
| | M.2 3052 B-Key x 1 (LTE) |
| | M.2 2280 M-Key x 1 (NVMe) |
| | 2.5" SATA x 1 |
| | SIM Slot x 2 |
| Indicator | Power LED x 1 |
| OS Support | Linux (NVIDIA JetPack™ 5.0 and above) |

## Power Supply

| | |
|---|---|
| Power Requirement | 3-pin Terminal Block x 1 for 9V ~ 36V ACC Ignition Delay On/Off |

## Mechanical

| | |
|---|---|
| Mounting | Wall Mount Kit |
| Dimensions (W x D x H) | 8.27" x 6.46" x 2.99" (210mm x 164.2mm x 76mm) w/o Bracket |
| | 9.69" x 6.46" x 3.27" (246mm x 164.2mm x 83mm) w/ Bracket |
| Gross Weight | 8.6 lb. (3.9Kg) |
| Net Weight | 6.7 lb. (3Kg) |

## Environmental

| | |
|---|---|
| **Operating Temperature** | 5°F ~ 140°F (-15°C ~ 60°C with 0.7 m/s airflow, with Industrial wide Temp. SSD) |
| **Storage Temperature** | -40°F ~ 185°F (-40°C ~ 85°C) |
| **Storage Humidity** | 5 ~ 95% @40°C, non-condensing |
| **Anti-Vibration** | MIL-STD-810G, 514.6C Procedure 1, Category 4 Trucker/Semitrailer on US highway (Figure 514.6C-1-Category 4-Common carrier) |
| **Anti-Shock** | MIL-STD-810G, Method 516.6, Procedure I, flight vehicle equipment |
| **Certification** | CE/FCC Class A, E-Mark |

**Note**: 4 PoE ports sharing one MAC address and one Giga bandwidth.

**Note**: AAEON recommends using industrial wide-temperature Gen 3 storage. If using Gen 4 storage, a thermal solution is required for adequate heat dissipation. For any queries regarding these requirements, please contact your AAEON representative.

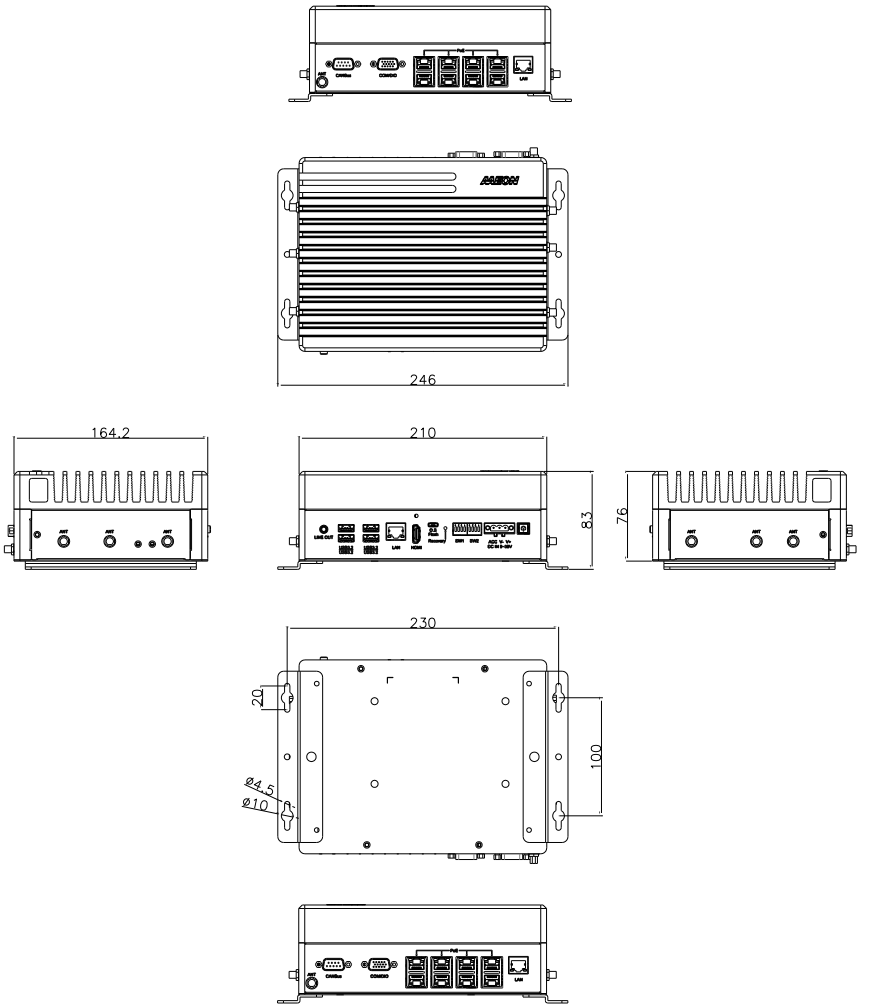
**Note**: Helps to record vehicle movement status, providing flexible connectivity and scalability.

# Chapter 2

Hardware Information

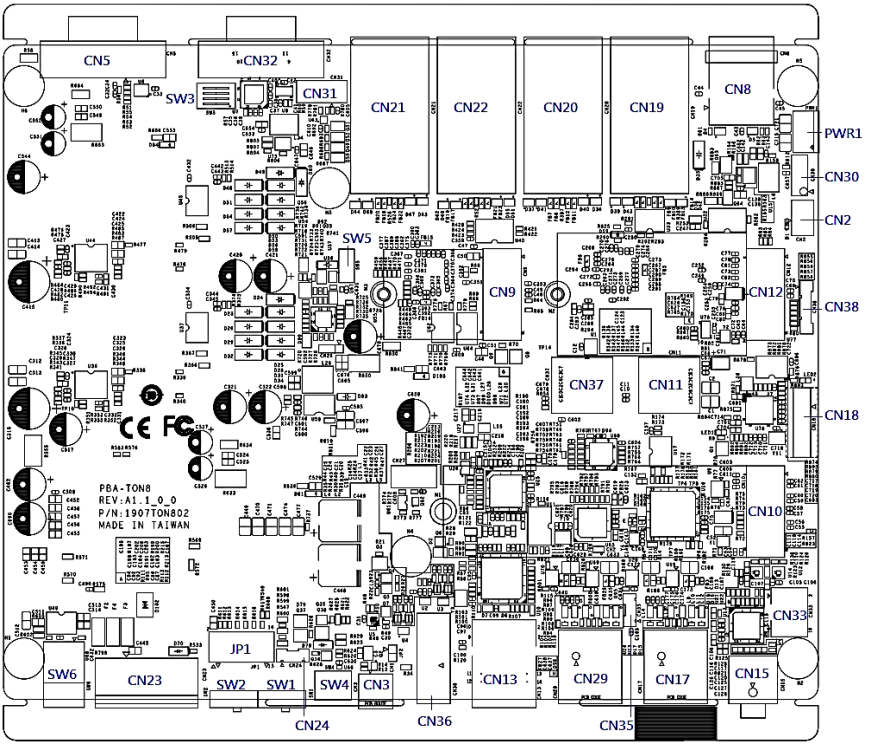
## 2.1 Dimensions

### System



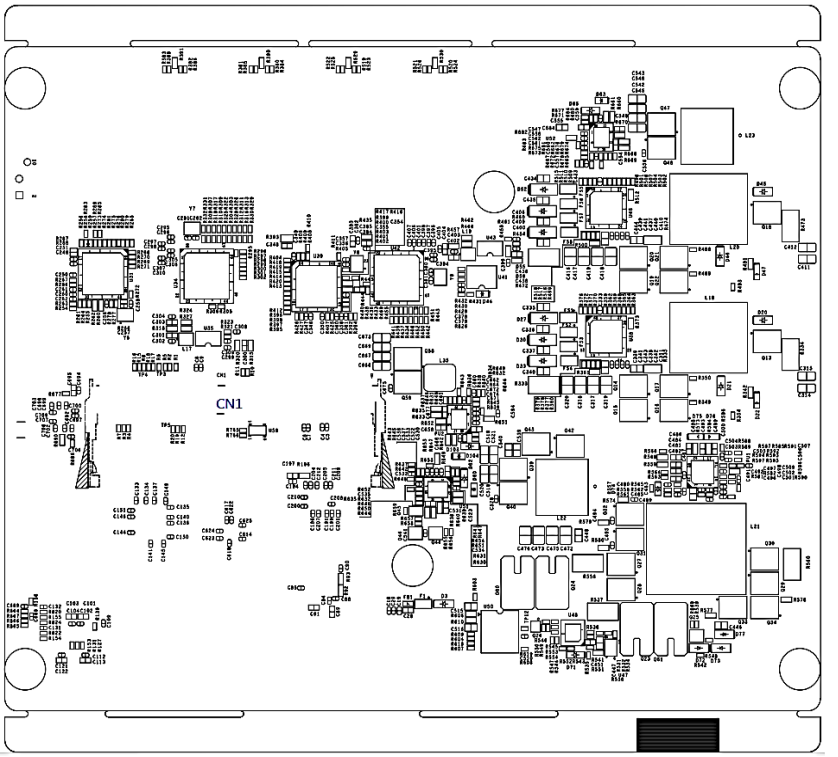
## 2.2 Jumpers and Connectors

### Top




**Note**: For information regarding how to access the system's PCBA, please see section 2.4.

## Bottom



## 2.3 List of Jumpers

The board has a number of jumpers that allow you to configure your system to suit your application.

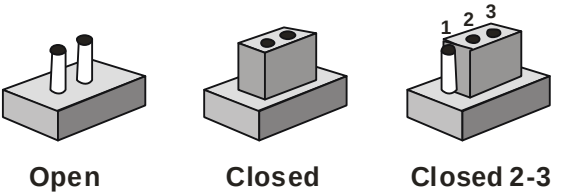
The table below shows the function of each of the board's jumpers

| Label | Function |
|---|---|
| JP1 | Vehicle MCU Control Setting |
| CN30 | Front Panel |

### 2.3.1 Jumper Settings

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip.

To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.




A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

### 2.3.2 Vehicle MCU Control Setting (JP1)

| Pin | Function |
|---|---|
| 1 | GND |
| 2 | ACC_ON_SET0 |
| 3 | GND |
| 4 | ACC_ON_SET1 |
| 5 | GND |
| 6 | ACC_ON_SET2 |
| 7 | GND |
| 8 | ACC_OFF_SET0 |
| 9 | GND |
| 10 | ACC_OFF_SET1 |
| 11 | GND |
| 12 | ACC_OFF_SET2 |
| 13 | GND |
| 14 | AT_ATX_SEL |
| 15 | PWR12V_EN |
| 16 | 3789_EN |

| ACC ON Delay Setting Table | | | |
|---|---|---|---|
| Jumper Pin | | | |
| 5, 6 | 3, 4 | 1, 2 | Delay Time |
| OPEN | OPEN | OPEN | 1 sec |
| OPEN | OPEN | SHORT | 3 sec |
| OPEN | SHORT | OPEN | 5 sec |
| OPEN | SHORT | SHORT | 10 sec |
| SHORT | OPEN | OPEN | 15 sec |
| SHORT | OPEN | SHORT | 20 sec |
| SHORT | SHORT | OPEN | 25 sec |
| SHORT | SHORT | SHORT | 30 sec |

| ACC OFF Delay Setting Table | | | |
|---|---|---|---|
| Jumper Pin | | | |
| 11, 12 | 9, 10 | 7, 8 | Delay Time |
| OPEN | OPEN | OPEN | 1 min |
| OPEN | OPEN | SHORT | 3 min |
| OPEN | SHORT | OPEN | 5 min |
| OPEN | SHORT | SHORT | 10 min |
| SHORT | OPEN | OPEN | 30 min |
| SHORT | OPEN | SHORT | 60 min |
| SHORT | SHORT | OPEN | 120 min |
| SHORT | SHORT | SHORT | 0 min |

| POWER OFF MODE Selection Setting Table | | | |
|---|---|---|---|
| Jumper Pin | | | |
| 11, 12 | 9, 10 | | Delay Time |
| OPEN | OPEN | | 1 min |
| OPEN | OPEN | | 3 min |
| OPEN | SHORT | | 5 min |
| OPEN | SHORT | | 10 min |

| AT/ATX MODE Selection Setting Table | |
|---|---|
| Jumper Pin | |
| 13,14 | MODE |
| ON | AT (Cut power source directly) |
| OFF | ATX (Normal power off) |

| MCU Control setting Table | |
|---|---|
| Jumper Pin | |
| 15,16 | MODE |
| ON | MCU control |
| OFF | Non MCU control |

### 2.3.3 Front Panel (CN30)

| Pin | Function |
|---|---|
| 7-8 | Open AT (Default) |
| 7-8 | Close ATX |

## 2.4 List of Connectors

The board has a number of connectors that allow you to configure your system to suit your application.

The table below shows the function of each of the board's connectors

| Label | Function |
|---|---|
| CN1 | Jetson Orin NX Module Connector |
| CN2 | RTC Connector |
| CN3 | Micro USB for Flash Image |
| CN5 | CANBus Connector |
| CN8 | LAN Port |
| CN9 | M.2 2230 E-Key |
| CN10 | M.2 2280 M-Key |
| CN11 | SIM Socket 1 |
| CN12 | M.2 3052 B-Key |
| CN13 | LAN Port |
| CN15 | Audio Line Out |
| CN17 | USB 3.2 Port |
| CN18 | SATA |
| CN19 | PoE Port 1/2 |
| CN20 | PoE Port 3/4 |
| CN21 | PoE Port 5/6 |
| CN22 | PoE Port 7/8 |
| CN23 | DC Power in Connector |
| CN27 | Fan Header |
| CN29 | USB 3.2 Port |
| CN31 | UART for Debug Port |
| CN32 | COM Port /8-Bit DIO Connector |
| CN33 | Audio Panel Header |
| CN35 | USB 2.0 Connector |
| CN36 | HDMI Port |
| CN37 | SIM Socket 2 |

| Label | Function |
|---|---|
| CN38 | UART/I2C for GPS/9 axis Sensor Board (optional) |
| SW1 | Switch for Vehicle MCU Setting Select |
| SW2 | Switch for Vehicle MCU Setting Select |
| SW3 | Switch for RS-232/RS422/RS-485 Select |
| SW4 | Recovery Switch |
| SW5 | Reset Switch |
| SW6 | Power Switch |
| PWR1 | SATA Power Connector |

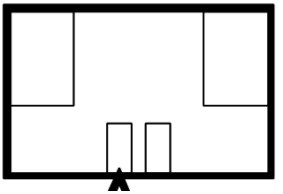
### 2.4.1 Jetson Orin NX Module Connector (CN1)

| Jetson SODIMM Signal Name | Jetson Orin NX Function | Pin # Top Odd | | Pin # Bottom Even | Jetson SODIMM Signal Name | Jetson Orin NX Function |
|---|---|---|---|---|---|---|
| GND | GND | 1 | | 2 | GND | GND |
| CSI1_D0_N | CSI1_D0_N | 3 | | 4 | CSI0_D0_N | CSI0_D0_N |
| CSI1_D0_P | CSI1_D0_P | 5 | | 6 | CSI0_D0_P | CSI0_D0_P |
| GND | GND | 7 | | 8 | GND | GND |
| CSI1_CLK_N | CSI1_CLK_N | 9 | | 10 | CSI0_CLK_N | CSI0_CLK_N |
| CSI1_CLK_P | CSI1_CLK_P | 11 | | 12 | CSI0_CLK_P | CSI0_CLK_P |
| GND | GND | 13 | | 14 | GND | GND |
| CSI1_D1_N | CSI1_D1_N | 15 | | 16 | CSI0_D1_N | CSI0_D1_N |
| CSI1_D1_P | CSI1_D1_P | 17 | | 18 | CSI0_D1_P | CSI0_D1_P |
| GND | GND | 19 | | 20 | GND | GND |
| CSI3_D0_N | CSI3_D0_N | 21 | | 22 | CSI2_D0_N | CSI2_D0_N |
| CSI3_D0_P | CSI3_D0_P | 23 | | 24 | CSI2_D0_P | CSI2_D0_P |
| GND | GND | 25 | | 26 | GND | GND |
| CSI3_CLK_N | CSI3_CLK_N | 27 | | 28 | CSI2_CLK_N | CSI2_CLK_N |
| CSI3_CLK_P | CSI3_CLK_P | 29 | | 30 | CSI2_CLK_P | CSI2_CLK_P |
| GND | GND | 31 | | 32 | GND | GND |
| CSI3_D1_N | CSI3_D1_N | 33 | | 34 | CSI2_D1_N | CSI2_D1_N |
| CSI3_D1_P | CSI3_D1_P | 35 | | 36 | CSI2_D1_P | CSI2_D1_P |
| GND | GND | 37 | | 38 | GND | GND |
| DP0_TXD0_N | USBSS1_RX_N | 39 | | 40 | CSI4_D2_N | PCIE2_RX0_N |
| DP0_TXD0_P | USBSS1_RX_P | 41 | | 42 | CSI4_D2_P | PCIE2_RX0_P |
| GND | GND | 43 | | 44 | GND | GND |
| DP0_TXD1_N | USBSS1_TX_N | 45 | | 46 | CSI4_D0_N | PCIE2_TX0_N |
| DP0_TXD1_P | USBSS1_TX_P | 47 | | 48 | CSI4_D0_P | PCIE2_TX0_P |
| GND | GND | 49 | | 50 | GND | GND |
| DP0_TXD2_N | USBSS2_RX_N | 51 | | 52 | CSI4_CLK_N | PCIE2_CLK_N |
| DP0_TXD2_P | USBSS2_RX_P | 53 | | 54 | CSI4_CLK_P | PCIE2_CLK_P |
| GND | GND | 55 | | 56 | GND | GND |
| DP0_TXD3_N | USBSS2_TX_N | 57 | | 58 | CSI4_D1_N | PCIE2_RX1_N (PCIE3_RX0_N) |
| DP0_TXD3_P | USBSS2_TX_P | 59 | | 60 | CSI4_D1_P | PCIE2_RX1_P (PCIE3_RX0_P) |
| GND | GND | 61 | | 62 | GND | GND |
| DP1_TXD0_N | DP1_TXD0_N | 63 | | 64 | CSI4_D3_N | PCIE2_TX1_N (PCIE3_TX0_N) |
| DP1_TXD0_P | DP1_TXD0_P | 65 | | 66 | CSI4_D3_P | PCIE2_TX1_P (PCIE3_TX0_P) |
| GND | GND | 67 | | 68 | GND | GND |
| DP1_TXD1_N | DP1_TXD1_N | 69 | | 70 | DSI_D0_N | RSVD |
| DP1_TXD1_P | DP1_TXD1_P | 71 | | 72 | DSI_D0_P | RSVD |
| GND | GND | 73 | | 74 | GND | GND |
| DP1_TXD2_N | DP1_TXD2_N | 75 | | 76 | DSI_CLK_N | RSVD |
| DP1_TXD2_P | DP1_TXD2_P | 77 | | 78 | DSI_CLK_P | RSVD |
| GND | GND | 79 | | 80 | GND | GND |
| DP1_TXD3_N | DP1_TXD3_N | 81 | | 82 | DSI_D1_N | RSVD |
| DP1_TXD3_P | DP1_TXD3_P | 83 | | 84 | DSI_D1_P | RSVD |
| GND | GND | 85 | | 86 | GND | GND |
| GPIO00 | GPIO00 | 87 | | 88 | DP0_HPD | RSVD |
| SPI0_MOSI | SPI0_MOSI | 89 | | 90 | DP0_AUX_N | RSVD |
| SPI0_SCK | SPI0_SCK | 91 | | 92 | DP0_AUX_P | RSVD |
| SPI0_MISO | SPI0_MISO | 93 | | 94 | HDMI_CEC | HDMI_CEC |
| SPI0_CS0* | SPI0_CS0* | 95 | | 96 | DP1_HPD | DP1_HPD |
| SPI0_CS1* | SPI0_CS1* | 97 | | 98 | DP1_AUX_N | DP1_AUX_N |
| UART0_TXD | UART0_TXD | 99 | | 100 | DP1_AUX_P | DP1_AUX_P |
| UART0_RXD | UART0_RXD | 101 | | 102 | GND | GND |
| UART0_RTS* | UART0_RTS* | 103 | | 104 | SPI1_MOSI | SPI1_MOSI |
| UART0_CTS* | UART0_CTS* | 105 | | 106 | SPI1_SCK | SPI1_SCK |
| GND | GND | 107 | | 108 | SPI1_MISO | SPI1_MISO |
| USB0_D_N | USB0_D_N | 109 | | 110 | SPI1_CS0* | SPI1_CS0* |
| USB0_D_P | USB0_D_P | 111 | | 112 | SPI1_CS1* | SPI1_CS1* |

| Jetson SODIMM Signal Name | Jetson Orin NX Function | Pin # Top Odd | | Pin # Bottom Even | Jetson SODIMM Signal Name | Jetson Orin NX Function |
|---|---|---|---|---|---|---|
| GND | GND | 113 | | 114 | CAM0_PWDN | CAM0_PWDN |
| USB1_D_N | USB1_D_N | 115 | | 116 | CAM0_MCLK | CAM0_MCLK |
| USB1_D_P | USB1_D_P | 117 | | 118 | GPIO01 | GPIO01 (CLK) |
| GND | GND | 119 | | 120 | CAM1_PWDN | CAM1_PWDN |
| USB2_D_N | USB2_D_N | 121 | | 122 | CAM1_MCLK | CAM1_MCLK |
| USB2_D_P | USB2_D_P | 123 | | 124 | GPIO02 | GPIO02 |
| GND | GND | 125 | | 126 | GPIO03 | GPIO03 |
| GPIO04 | GPIO04 | 127 | | 128 | GPIO05 | GPIO05 |
| GND | GND | 129 | | 130 | GPIO06 | GPIO06 |
| PCIE0_RX0_N | PCIE0_RX0_N | 131 | | 132 | GND | GND |
| PCIE0_RX0_P | PCIE0_RX0_P | 133 | | 134 | PCIE0_TX0_N | PCIE0_TX0_N |
| GND | GND | 135 | | 136 | PCIE0_TX0_P | PCIE0_TX0_P |
| PCIE0_RX1_N | PCIE0_RX1_N | 137 | | 138 | GND | GND |
| PCIE0_RX1_P | PCIE0_RX1_P | 139 | | 140 | PCIE0_TX1_N | PCIE0_TX1_N |
| GND | GND | 141 | | 142 | PCIE0_TX1_P | PCIE0_TX1_P |
| CAN_RX | CAN_RX | 143 | | 144 | GND | GND |
| CAN_TX | CAN_TX | 145 | | 146 | GND | GND |
| GND | GND | 147 | | 148 | PCIE0_TX2_N | PCIE0_TX2_N |
| PCIE0_RX2_N | PCIE0_RX2_N | 149 | | 150 | PCIE0_TX2_P | PCIE0_TX2_P |
| PCIE0_RX2_P | PCIE0_RX2_P | 151 | | 152 | GND | GND |
| GND | GND | 153 | | 154 | PCIE0_TX3_N | PCIE0_TX3_N |
| PCIE0_RX3_N | PCIE0_RX3_N | 155 | | 156 | PCIE0_TX3_P | PCIE0_TX3_P |
| PCIE0_RX3_P | PCIE0_RX3_P | 157 | | 158 | GND | GND |
| GND | GND | 159 | | 160 | PCIE0_CLK_N | PCIE0_CLK_N |
| USBSS_RX_N | USBSS0_RX_N | 161 | | 162 | PCIE0_CLK_P | PCIE0_CLK_P |
| USBSS_RX_P | USBSS0_RX_P | 163 | | 164 | GND | GND |
| GND | GND | 165 | | 166 | USBSS_TX_N | USBSS0_TX_N |
| PCIE1_RX0_N | PCIE1_RX0_N | 167 | | 168 | USBSS_TX_P | USBSS0_TX_P |
| PCIE1_RX0_P | PCIE1_RX0_P | 169 | | 170 | GND | GND |
| GND | GND | 171 | | 172 | PCIE1_TX0_N | PCIE1_TX0_N |
| PCIE1_CLK_N | PCIE1_CLK_N | 173 | | 174 | PCIE1_TX0_P | PCIE1_TX0_P |
| PCIE1_CLK_P | PCIE1_CLK_P | 175 | | 176 | GND | GND |
| GND | GND | 177 | | 178 | MOD_SLEEP* | MOD_SLEEP* |
| PCIE_WAKE* | PCIE_WAKE* | 179 | | 180 | PCIE0_CLKREQ* | PCIE0_CLKREQ* |
| PCIE0_RST* | PCIE0_RST* | 181 | | 182 | PCIE1_CLKREQ* | PCIE1_CLKREQ* |
| PCIE1_RST* | PCIE1_RST* | 183 | | 184 | GBE_MDI0_N | GBE_MDI0_N |
| I2C0_SCL | I2C0_SCL | 185 | | 186 | GBE_MDI0_P | GBE_MDI0_P |
| I2C0_SDA | I2C0_SDA | 187 | | 188 | GBE_LED_LINK | GBE_LED_LINK |
| I2C1_SCL | I2C1_SCL | 189 | | 190 | GBE_MDI1_N | GBE_MDI1_N |
| I2C1_SDA | I2C1_SDA | 191 | | 192 | GBE_MDI1_P | GBE_MDI1_P |
| I2S0_DOUT | I2S0_DOUT | 193 | | 194 | GBE_LED_ACT | GBE_LED_ACT |
| I2S0_DIN | I2S0_DIN | 195 | | 196 | GBE_MDI2_N | GBE_MDI2_N |
| I2S0_FS | I2S0_FS | 197 | | 198 | GBE_MDI2_P | GBE_MDI2_P |
| I2S0_SCLK | I2S0_SCLK | 199 | | 200 | GND | GND |
| GND | GND | 201 | | 202 | GBE_MDI3_N | GBE_MDI3_N |
| UART1_TXD | UART1_TXD | 203 | | 204 | GBE_MDI3_P | GBE_MDI3_P |
| UART1_RXD | UART1_RXD | 205 | | 206 | GPIO07 | GPIO07 |
| UART1_RTS* | UART1_RTS* | 207 | | 208 | GPIO08 | GPIO08 |
| UART1_CTS* | UART1_CTS* | 209 | | 210 | CLK_32K_OUT | CLK_32K_OUT |
| GPIO09 | GPIO09 | 211 | | 212 | GPIO10 | GPIO10 |
| CAM_I2C_SCL | CAM_I2C_SCL | 213 | | 214 | FORCE_RECOVERY* | FORCE_RECOVERY* |
| CAM_I2C_SDA | CAM_I2C_SDA | 215 | | 216 | GPIO11 | GPIO11 |
| GND | MODULE_ID | 217 | | 218 | GPIO12 | GPIO12 |
| SDMMC_DAT0 | PCIE2_RST* | 219 | | 220 | I2S1_DOUT | I2S1_DOUT |
| SDMMC_DAT1 | PCIE2_CLKREQ* | 221 | | 222 | I2S1_DIN | I2S1_DIN |
| SDMMC_DAT2 | PCIE3_RST* | 223 | | 224 | I2S1_FS | I2S1_FS |
| SDMMC_DAT3 | PCIE3_CLKREQ* | 225 | | 226 | I2S1_SCLK | I2S1_SCLK |
| SDMMC_CMD | PCIE3_CLK_N | 227 | | 228 | GPIO13 | GPIO13 |
| SDMMC_CLK | PCIE3_CLK_P | 229 | | 230 | GPIO14 | GPIO14 |
| GND | GND | 231 | | 232 | I2C2_SCL | I2C2_SCL |
| SHUTDOWN_REQ* | SHUTDOWN_REQ* | 233 | | 234 | I2C2_SDA | I2C2_SDA |
| PMIC_BBAT | PMIC_BBAT | 235 | | 236 | UART2_TXD | UART2_TXD |

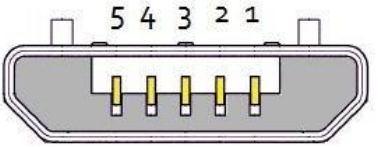
| Jetson SODIMM Signal Name | Jetson Orin NX Function | Pin # Top Odd | | Pin # Bottom Even | Jetson SODIMM Signal Name | Jetson Orin NX Function |
|---|---|---|---|---|---|---|
| POWER_EN | POWER_EN | 237 | | 238 | UART2_RXD | UART2_RXD |
| SYS_RESET* | SYS_RESET* | 239 | | 240 | SLEEP/WAKE* | SLEEP/WAKE* |
| GND | GND | 241 | | 242 | GND | GND |
| GND | GND | 243 | | 244 | GND | GND |
| GND | GND | 245 | | 246 | GND | GND |
| GND | GND | 247 | | 248 | GND | GND |
| GND | GND | 249 | | 250 | GND | GND |
| VDD_IN | VDD_IN | 251 | | 252 | VDD_IN | VDD_IN |
| VDD_IN | VDD_IN | 253 | | 254 | VDD_IN | VDD_IN |
| VDD_IN | VDD_IN | 255 | | 256 | VDD_IN | VDD_IN |
| VDD_IN | VDD_IN | 257 | | 258 | VDD_IN | VDD_IN |
| VDD_IN | VDD_IN | 259 | | 260 | VDD_IN | VDD_IN |

### 2.4.2 RTC Battery Connector (CN2)



| Pin | Signal |
|---|---|
| 1 | +3V |
| 2 | GND |

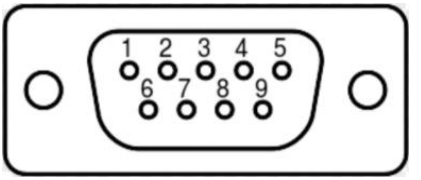
### 2.4.3 Micro USB for Flash Image (CN3)




USB Micro-B

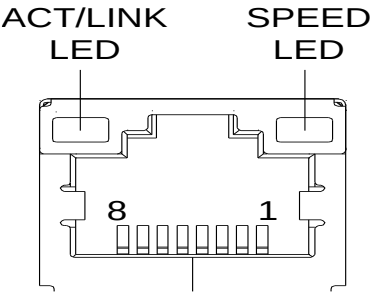
| Pin | Signal |
|---|---|
| 1 | VBUS |
| 2 | D- |
| 3 | D+ |
| 4 | |
| 5 | GND |

### 2.4.4 CANBus Connector (CN5)




| Pin | Signal |
|---|---|
| 1 | |
| 2 | CAN0_L |
| 3 | |
| 4 | |
| 5 | GND |
| 6 | |
| 7 | CAN0_H |
| 8 | |
| 9 | |

### 2.4.5 LAN Port (CN8)




| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | MDI0+ | 2 | MDI0- |
| 3 | MDI1+ | 4 | MDI1- |
| 5 | MDI2+ | 6 | MDI2- |
| 7 | MDI3+ | 8 | MDI3- |

## 2.4.6 M.2 2230 E-Key (CN9)

| | | | |
|---|---|---|---|
| 74 | 3.3V | GND | 75 |
| 72 | 3.3V | RESERVED/REFCLKn1 | 73 |
| 70 | UIM_POWER_SRC/GPIO_1/PEWAKE1# | RESERVED/REFCLKp1 | 71 |
| 68 | UIM_POWER_SNK/CLKREQ1# | GND | 69 |
| 66 | UIM_SWP/PERST1# | RESERVED/PERn1 | 67 |
| 64 | RESERVED | RESERVED/PERp1 | 65 |
| 62 | ALERT# (I)(0/1.8 V) | GND | 63 |
| 60 | I2C_CLK (O)(0/1.8 V) | RESERVED/PETn1 | 61 |
| 58 | I2C_DATA (I/O)(0/1.8 V) | RESERVED/PETp1 | 59 |
| 56 | W_DISABLE1# (O)(0/3.3V) | GND | 57 |
| 54 | W_DISABLE2# (O)(0/3.3V) | PEWAKE0# (I/O)(0/3.3V) | 55 |
| 52 | PERST0# (O)(0/3.3V) | CLKREQ0# (I/O)(0/3.3V) | 53 |
| 50 | SUSCLK(32kHz) (O)(0/3.3V) | GND | 51 |
| 48 | COEX_TXD (O)(0/1.8V) | REFCLKn0 | 49 |
| 46 | COEX_RXD (I)(0/1.8V) | REFCLKp0 | 47 |
| 44 | COEX3 (I/O)(0/1.8V) | GND | 45 |
| 42 | VENDOR DEFINED | PERn0 | 43 |
| 40 | VENDOR DEFINED | PERp0 | 41 |
| 38 | VENDOR DEFINED | GND | 39 |
| 36 | UART RTS (O)(0/1.8V) | PETn0 | 37 |
| 34 | UART CTS (I)(0/1.8V) | PETp0 | 35 |
| 32 | UART TXD (O)(0/1.8V) | GND | 33 |
| | Key E | Key E | |
| | Key E | Key E | |
| | Key E | Key E | |
| | Key E | Key E | |
| | Key E | SDIO RESET#/TX_BLANKING (O)(0/1.8V) | 23 |
| 22 | UART RXD (I)(0/1.8V) | SDIO WAKE# (I)(0/1.8V) | 21 |
| 20 | UART WAKE# (I)(0/3.3V) | SDIO DATA3(I/O)(0/1.8V) | 19 |
| 18 | GND | SDIO DATA2(I/O)(0/1.8V) | 17 |
| 16 | LED_2# (I)(OD) | SDIO DATA1(I/O)(0/1.8V) | 15 |
| 14 | PCM_OUT/I2S SD_OUT (O)(0/1.8V) | SDIO DATA0(I/O)(0/1.8V) | 13 |
| 12 | PCM_IN/I2S SD_IN (I)(0/1.8V) | SDIO CMD(I/O)(0/1.8V) | 11 |
| 10 | PCM_SYNC/I2S WS (I/O)(0/1.8V) | SDIO CLK/SYSCLK (O)(0/1.8V) | 9 |
| 8 | PCM_CLK/I2S SCK (I/O)(0/1.8V) | GND | 7 |
| 6 | LED_1# (I)(OD) | USB_D- | 5 |
| 4 | 3.3V | USB_D+ | 3 |
| 2 | 3.3V | GND | 1 |

### 2.4.7 M.2 2280 M-Key (CN10)

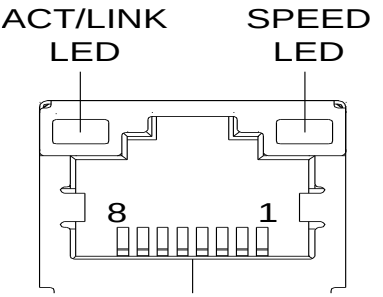
| Pin Number | Pin Name | Description | Voltage |
|---|---|---|---|
| 1 | CONFIG_3 | Defines module type | |
| 2 | 3.3 V | Supply pin | 3.3 V |
| 3 | GND | Ground | |
| 4 | 3.3 V | Supply pin | 3.3 V |
| 5 | PERn3 | PCIe Lane 3 Rx | |
| 6 | N/A | | |
| 7 | PERp3 | PCIe Lane 3 Rx | |
| 8 | N/A | | |
| 9 | GND | Ground | |
| 10 | N/A | | |
| 11 | PETn3 | PCIe Lane 3 Tx | |
| 12 | 3.3 V | Supply pin | 3.3 V |
| 13 | PETp3 | PCIe Lane 3 Tx | |
| 14 | 3.3 V | Supply pin | 3.3 V |
| 15 | GND | Ground | |
| 16 | 3.3V | Supply pin | 3.3 V |
| 17 | PERn2 | PCIe Lane 2 Rx | |
| 18 | 3.3 V | Supply pin | 3.3 V |
| 19 | PERp2 | PCIe Lane 2 Rx | |
| 20 | N/A | | |
| 21 | CONFIG_0 | Defines module type | |
| 22 | N/A | | |
| 23 | PETn2 | PCIe Lane 2 Tx | |
| 24 | N/A | | |
| 25 | PETp2 | PCIe Lane 2 Tx | |
| 26 | N/A | | |
| 27 | GND | Ground | |
| 28 | N/A | | |
| 29 | PERn1 | PCIe Lane 1 Rx | |
| 30 | N/A | | |
| 31 | PERp1 | PCIe Lane 1 Rx | |
| 32 | N/A | | |
| 33 | GND | Ground | |
| 34 | N/A | | |
| 35 | PETn1 | PCIe Lane 1 Tx | |
| 36 | N/A | | |
| 37 | PETp1 | PCIe Lane 1 Tx | |
| 38 | DEVSLP | Device Sleep, input. If driven high the host is informing the SSD to enter a low power state. | |
| 39 | GND | Ground | |
| 40 | N/A | | |
| 41 | PERn0 | Host receiver differential signal pair. If in PCIe mode PCIe Lane 0 Rx | |
| 42 | N/A | | |
| 43 | PERp0 | Host receiver differential signal pair. If in PCIe mode PCIe Lane 0 Rx | |

| | | | |
|---|---|---|---|
| 44 | N/A | | |
| 45 | GND | Ground | |
| 46 | N/A | | |
| 47 | PETn0 | Host transmitter differential signal pair. If in PCIe mode PCIe Lane 0 Tx | |
| 48 | N/A | | |
| 49 | PETp0 | Host transmitter differential signal pair. If in PCIe mode PCIe Lane 0 Tx | |
| 50 | PERST# | PCIe reset | |
| 51 | GND | Ground | |
| 52 | CLKREQ# | Reference clock request signal | |
| 53 | REFCLKN | PCIe Reference Clock signals (100 MHz) | |
| 54 | PEWAKE# | PCIe WAKE# Open Drain with pull up on platform. Active Low. | |
| 55 | REFCLKP | PCIe Reference Clock signals (100 MHz) | |
| 56 | MFG1 | Manufacturing pin. Use determined by vendor. | |
| 57 | GND | Ground | |
| 58 | MFG2 | Manufacturing pin. Use determined by vendor. | |
| 59-66 | removed | Mechanical notch M | |
| 67 | N/A | | |
| 68 | SUSCLK | 32.768 kHz clock supply input provided by the Platform chipset | |
| 69 | CONFIG_1 | Defines module type | |
| 70 | 3.3 V | Supply pin | 3.3 V |
| 71 | GND | Ground | |
| 72 | 3.3 V | Supply pin | 3.3 V |
| 73 | GND | Ground | |
| 74 | 3.3 V | Supply pin | 3.3 V |
| 75 | CONFIG_2 | Defines module type | |

## 2.4.8 M.2 3052 B-Key (CN12)

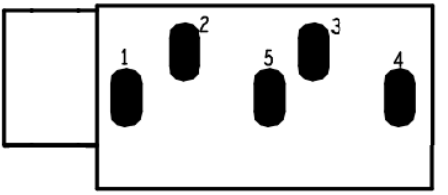
| | | | |
|---|---|---|---|
| 74 | 3.3 V/VBAT | CONFIG_2 | 75 |
| 72 | 3.3 V/VBAT | GND | 73 |
| 70 | 3.3 V/VBAT | GND | 71 |
| 68 | SUSCLK(32kHz) (O)(0/3.3V) | CONFIG_1 | 69 |
| 66 | SIM DETECT (O) | RESET# (O)(0/1.8V) | 67 |
| 64 | COEX_RXD (I)(0/1.8V) | ANTCTL3 (I)(0/1.8V) | 65 |
| 62 | COEX_TXD (O)(0/1.8V) | ANTCTL2 (I)(0/1.8V) | 63 |
| 60 | COEX3 (I/O)(0/1.8V) | ANTCTL1 (I)(0/1.8V) | 61 |
| 58 | NC | ANTCTL0 (I)(0/1.8V) | 59 |
| 56 | NC | GND | 57 |
| 54 | PEWAKE# (I/O)(0/3.3V) | REFCLKp | 55 |
| 52 | CLKREQ# (I/O)(0/3.3V) | REFCLKn | 53 |
| 50 | PERST# (O)(0/3.3V) | GND | 51 |
| 48 | GPIO_4 (I/O)(0/1.8V) | PETp0 | 49 |
| 46 | GPIO_3 (I/O)(0/1.8V) | PETn0 | 47 |
| 44 | GPIO_2 (I/O)/ALERT# (I)/(0/1.8V) | GND | 45 |
| 42 | GPIO_1 (I/O)/SMB_DATA (I/O)/(0/1.8V) | PERp0 | 43 |
| 40 | GPIO_0 (I/O)/SMB_CLK (I/O)/(0/1.8V) | PERn0 | 41 |
| 38 | DEVSLP (O) | GND | 39 |
| 36 | UIM-PWR (I) | PETp1/USB3.1-Tx+/SSIC-TxP | 37 |
| 34 | UIM-DATA (I/O) | PETn1/USB3.1-Tx-/SSIC-TxN | 35 |
| 32 | UIM-CLK (I) | GND | 33 |
| 30 | UIM-RESET (I) | PERp1/USB3.1-Rx+/SSIC-RxP | 31 |
| 28 | GPIO_8 (I/O) (0/1.8V) | PERn1/USB3.1-Rx-/SSIC-RxN | 29 |
| 26 | GPIO_10 (I/O) (0/1.8V) | GND | 27 |
| 24 | GPIO_7 (I/O) (0/1.8V) | DPR (O) (0/1.8V) | 25 |
| 22 | GPIO_6 (I/O)(0/1.8V) | GPIO_11 (I/O) (0/1.8V) | 23 |
| 20 | GPIO_5 (I/O)(0/1.8V) | CONFIG_0 | 21 |
| | Key B | Key B | |
| | Key B | Key B | |
| | Key B | Key B | |
| | Key B | Key B | |
| | Key B | GND | 11 |
| 10 | GPIO_9/DAS/DSS (I/O)/LED_1# (I)(0/3.3V) | USB_D- | 9 |
| 8 | W_DISABLE1# (O)(0/3.3V) | USB_D+ | 7 |
| 6 | FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V) | GND | 5 |
| 4 | 3.3 V | GND | 3 |
| 2 | 3.3 V | CONFIG_3 | 1 |

### 2.4.9 LAN Port (CN13)



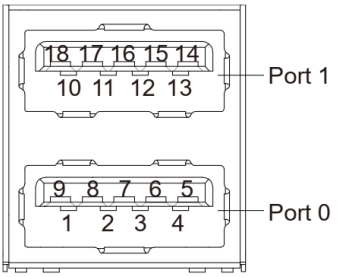

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | MDI0+ | 2 | MDI0- |
| 3 | MDI1+ | 4 | MDI1- |
| 5 | MDI2+ | 6 | MDI2- |
| 7 | MDI3+ | 8 | MDI3- |

### 2.4.10 Audio Line Out (CN15)



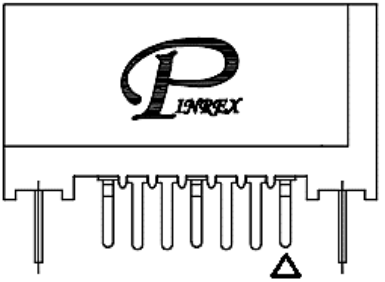

| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | Line_R |
| 3 | Line_L |
| 4 | |
| 5 | |

### 2.4.11 USB 3.2 Port (CN17)




| Pin | Signal | Pin | Signal |
|---|---|---|---|
| U1 | VBUS | U10 | VBUS |
| U2 | (A)D- | U11 | (B)D- |
| U3 | (A)D+ | U12 | (B)D+ |
| U4 | GND | U13 | GND |
| U5 | (A)SSRX- | U14 | (B)SSRX- |
| U6 | (A)SSRX+ | U15 | (B)SSRX+ |
| U7 | GND | U16 | GND |
| U8 | (A)SSTX- | U17 | (B)SSTX- |
| U9 | (A)SSTX+ | U18 | (B)SSTX+ |

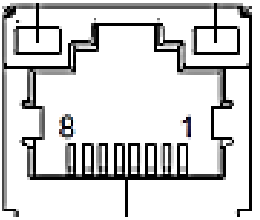
### 2.4.12 SATA Connector (CN18)



| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | TX+ |

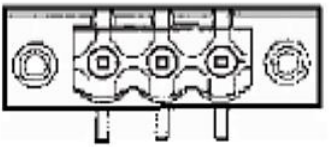
| Pin | Signal |
|---|---|
| 3 | TX- |
| 4 | GND |
| 5 | RX- |
| 6 | RX+ |
| 7 | GND |

### 2.4.13 PoE Port 1 ~ 8 (CN19/CN20/CN21/CN22)



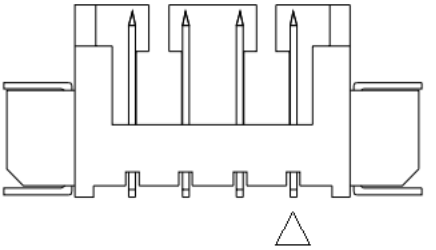

| Pin | Pin Name | Signal Type | Signal Level |
|---|---|---|---|
| 1 | MDI0+ | DIFF | |
| 2 | MDI0- | DIFF | |
| 3 | MDI1+ | DIFF | |
| 4 | MDI2+ | DIFF | |
| 5 | MDI2- | DIFF | |
| 6 | MDI1- | DIFF | |
| 7 | MDI3+ | DIFF | |
| 8 | MDI3- | DIFF | |

### 2.4.14 DC Power in Connector (CN23)



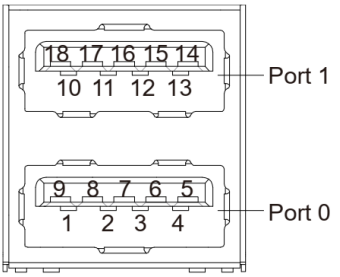

| Pin | Signal |
|---|---|
| 1 | PWR_IN |
| 2 | GND |
| 3 | ACC_IN |

### 2.4.15 Fan Header (CN27)



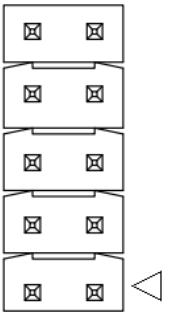
| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | VDD_12V |
| 3 | FAN_TACH |
| 4 | FAN_PWM_Q* |

### 2.4.16 USB 3.2 Port (CN29)



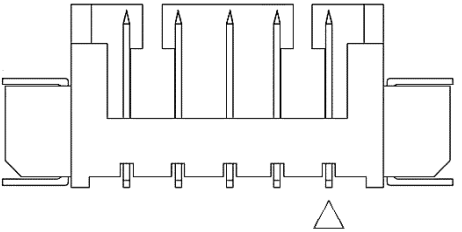

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| U1 | VBUS | U10 | VBUS |
| U2 | (A)D- | U11 | (B)D- |
| U3 | (A)D+ | U12 | (B)D+ |
| U4 | GND | U13 | GND |
| U5 | (A)SSRX- | U14 | (B)SSRX- |
| U6 | (A)SSRX+ | U15 | (B)SSRX+ |
| U7 | GND | U16 | GND |
| U8 | (A)SSTX- | U17 | (B)SSTX- |
| U9 | (A)SSTX+ | U18 | (B)SSTX+ |

### 2.4.17 Front Panel (CN30)



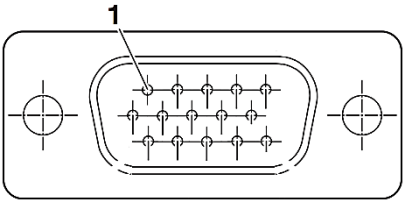
| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | PWR_BTN* | 2 | GND |
| 3 | FORCE_RECOVERY* | 4 | GND |
| 5 | SYS_RST* | 6 | GND |
| 7 | BMCU_ACOK | 8 | GND |
| 9 | 3V3_AO | 10 | VDD_5V_SYS |

### 2.4.18 UART for Debug Port (CN31)



| Pin | Signal |
|---|---|
| 1 | VDD_3V3_SYS |
| 2 | UART2_TXD |
| 3 | UART2_RXD |
| 4 | GND |
| 5 | GND |

### 2.4.19 COM Port /8-Bit DIO Connector (CN32)

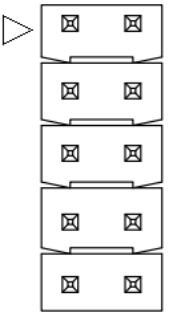



| Pin | RS-232 | RS-422 | RS-485 |
|---|---|---|---|
| 1 | | TX- | D- |
| 2 | TXD | TX+ | D+ |
| 3 | RXD | RX+ | |
| 4 | | RX- | |
| 5 | GND | | |
| 6 | DIO1 | | |
| 7 | DIO2 | | |
| 8 | DIO3 | | |
| 9 | DIO4 | | |
| 10 | GND | | |
| 11 | DIO5 | | |
| 12 | DIO6 | | |
| 13 | DIO7 | | |
| 14 | DIO8 | | |
| 15 | GND | | |

| 8-Bit DIO | |
|---|---|
| Pin | GPIO Index |
| 6 | PQ.05 |
| 7 | PG.06 |
| 8 | PN.01 |
| 9 | PH.00 |
| 10 | GND |
| 11 | PZ.06 |
| 12 | PZ.05 |

| 8-Bit DIO | |
|---|---|
| Pin | GPIO Index |
| 13 | PZ.04 |
| 14 | PZ.03 |
| 15 | GND |

### 2.4.20 Audio Panel Header (CN33)

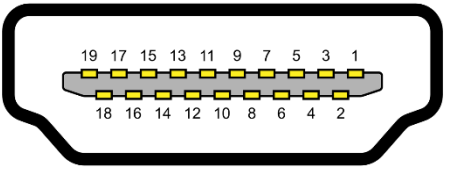


| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | MIC_L | 2 | AGND |
| 3 | MIC_R _RECOVERY* | 4 | AUDIO_PRSNT_L |
| 5 | HPOR_HDA | 6 | MIC_HDA |
| 7 | NC | 8 | NC |
| 9 | HPOL_HDA | 10 | HP_HDA |

### 2.4.21 USB 2.0 Connector (CN35)

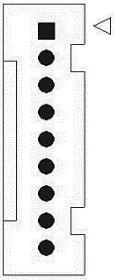
| Pin | Signal |
|---|---|
| 1 | 5V |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | GND |

### 2.4.22 HDMI Port (CN36)



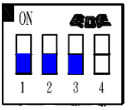
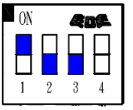
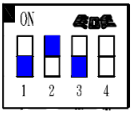
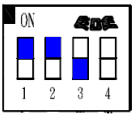
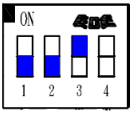

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | HDMI_DATA2_P | 2 | GND |
| 3 | HDMI_DATA2_N | 4 | HDMI_DATA1_P |
| 5 | GND | 6 | HDMI_DATA1_N |
| 7 | HDMI_DATA0_P | 8 | GND |
| 9 | HDMI_DATA0_N | 10 | HDMI_CLK_P |
| 11 | GND | 12 | HDMI_CLK_N |
| 13 | CEC | 14 | NC |
| 15 | HDMI_SCL | 16 | HDMI_SDA |
| 17 | GND | 18 | HDMI_PWR |
| 19 | HDMI_HDP | | |

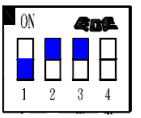
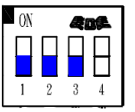
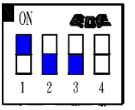
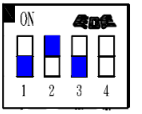
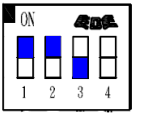
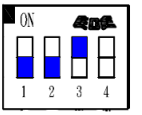
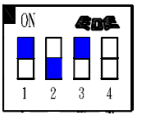
### 2.4.23 UART/I2C for GPS/9-axis Sensor Board (CN38)

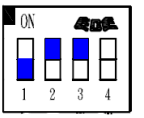
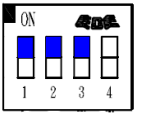
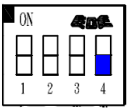
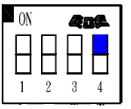
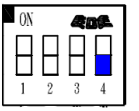
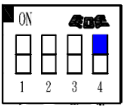


| Pin | Signal |
|---|---|
| 1 | 3.3V |
| 2 | 3.3V |
| 3 | I2C0_SCL |
| 4 | I2C0_SDA |
| 5 | GPIO |
| 6 | UART_TXD |
| 7 | UART_RXD |
| 8 | GND |
| 9 | GND |

## 2.4.24 Switch for Vehicle MCU Setting Select (SW1/SW2)

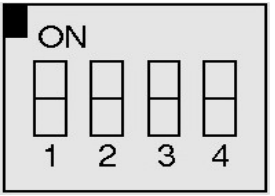

| Function | SW1 | SW2 | Set Time |
|---|---|---|---|
| ACC ON Delay Minutes Setting |  | | 1 Sec |
| |  | | 3 Sec |
| |  | | 5 Sec |
| |  | | 10 Sec |
| |  | | 15 Sec |
| |  | | 20 Sec |

| Function | SW1 | SW2 | Set Time |
|---|---|---|---|
| ACC ON Delay Minutes Setting |  | | 25 Sec |
| |  | | 30 Sec |
| **Function** | **SW1** | **SW2** | **Set Time** |
| ACC OFF Delay Minutes Setting | |  | 1 min |
| | |  | 3 min |
| | |  | 5 min |
| | |  | 10 min |
| | |  | 30 min |
| | |  | 60 min |

| Function | SW1 | SW2 | Set Time |
|---|---|---|---|
| ACC OFF Delay Minutes Setting | |  | 120 min |
| | |  | 0 min |
| **Function** | **SW1** | **SW2** | **Set Time** |
| Power Off AT/ATX MODE Selection |  | | Cut power source directly after ACC off delay time up |
| |  | | Normal Power off after ACC off delay time up |
| **Function** | **SW1** | **SW2** | **Set Time** |
| MCU Control Setting | |  | Non MCU Control |
| | |  | By MCU Control |

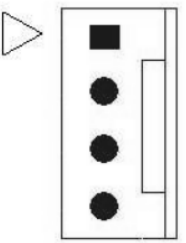
**Note**: Co-lay with JP1.

### 2.4.25 Switch for RS-232/RS422/RS-485 Select (SW3)




| Mode | S-1 | S-2 | S-3 | S-4 |
|---|---|---|---|---|
| 1T/1R RS-232 | On | On | | |
| 1T/1R RS-422 | On | Off | | |
| 1T/1R RS-485 | Off | On | | |
| Low power shutdown | Off | Off | | |
| 250kbps for RS-232 and RS-485/RS-422 | | | On | |
| RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps | | | Off | |
| Enable RS-422/RS-485 bias and termination resistors. | | | | On |
| Disable RS-422/RS-485 bias and termination resistors. | | | | Off |

### 2.4.26 SATA Power Connector (PWR1)



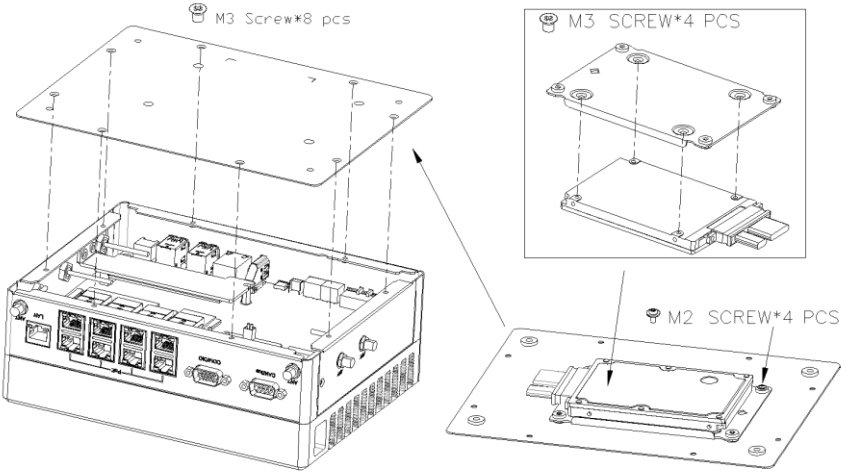
| Pin | Signal |
|---|---|
| 1 | 12V |
| 2 | GND |
| 3 | GND |
| 4 | 5V |

## 2.5 Hardware Installation

Before installing hard disk drives or expansion modules, ensure the system is powered down and disconnect the power cord from the system.

### 2.5.1 SATA Drive Installation

**Step 1:** Open the chassis by removing the eight (8) bottom panel screws.



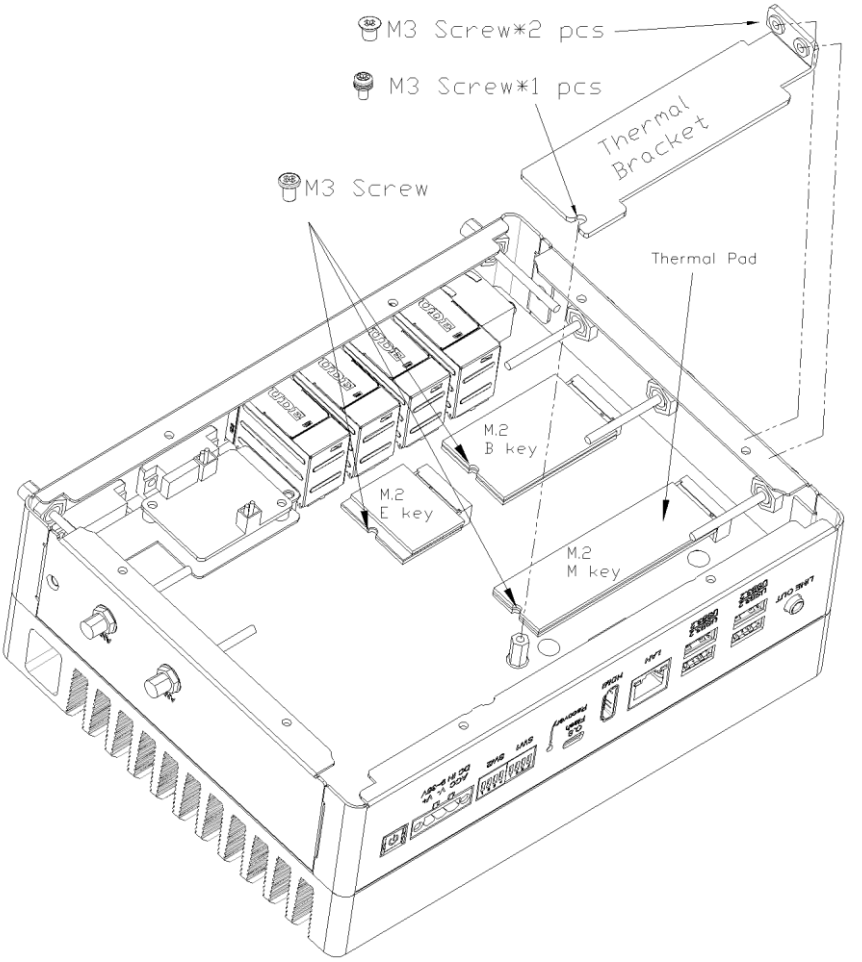

**Step 2**: Affix the SATA drive to the drive bay using the four (4) screws provided.

**Step 3**: Attach the drive bay to the bottom panel using the four (4) screws provided.

## 2.5.2 Expansion Module Installation

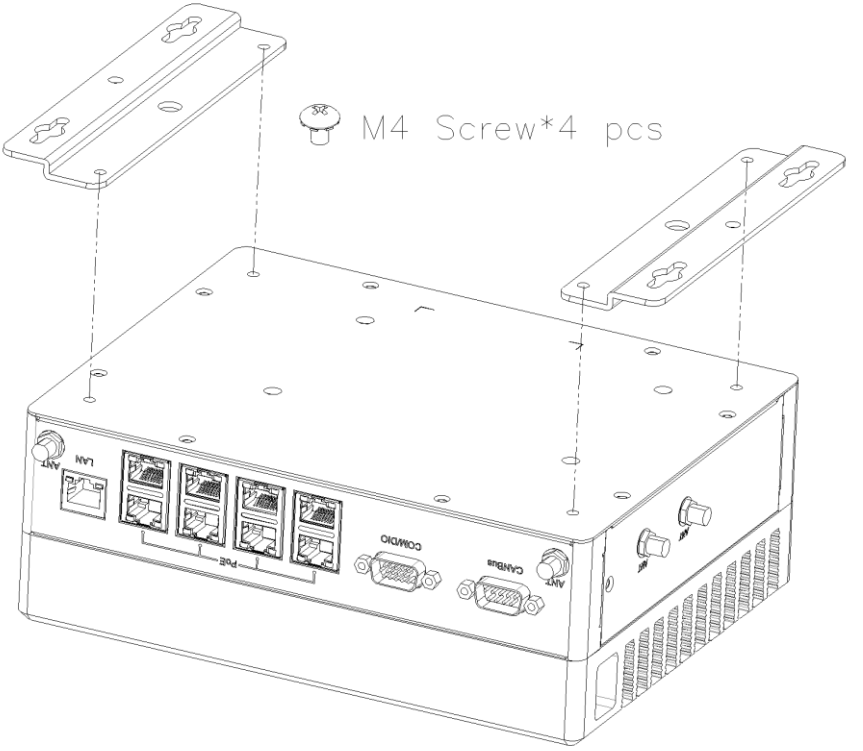
Install each expansion module by first inserting at an angle (approx. 30°), then gently press down and securing with the screws provided. Refer to the images below for guidance on M.2 Key slot location.

Note: Make sure to affix the thermal bracket using three (3) screws, as shown below. To replace the bottom panel, simply reaffix using the eight (8) screws removed during step 1 of section 2.5.1.



### 2.5.3 Wall Mount Installation

Secure the wall mount brackets to the chassis using the four (4) screws provided, as shown below.



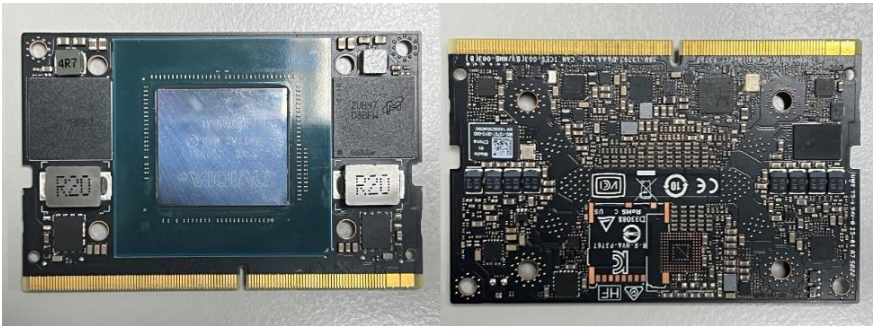
# Chapter 3

BSP Flash Guide

## 3.1 Before Installation

Before starting the process, make sure your BOXER-8658AI system is turned off and the power source is disconnected. You will need a Host PC running Ubuntu 18.04/20.04, and to make sure the NVIDIA Jetson Orin NX module is installed on the BOXER-8658AI carrier board system.

**Note:** Do not use a virtual machine as a host PC, as some virtual machines may have unstable USB connections which can cause the flash procedure to fail.



Download the compressed BSP image file "BOXER_8658AI_J5.1.2_A00_1.0.2_20231110.tar.gz" into the Host Ubuntu 18.04/20.04 PC directory.

**Note**: No spaces, special characters, or non-English characters can be used for the name of the folder where the file is stored, or its parent folder.

**Note**: Ensure the language settings of Ubuntu 18.04/20.04 are set to English, and the format setting is the United States, to prevent flash failure.

## 3.2 Connecting to PC/Force Recovery Mode

Step 1:

On the Host computer, open the Linux terminal and enter the following command to extract the compressed BSP image files (BSP file name may vary):

```
$ sudo tar -zxvf BOXER_8658AI_J5.1.2_A00_1.0.2_20231110.tar.gz
```

Note: Do not decompress the file (Internal.tar.gz) using a Windows OS, BSP should only be decompressed in a Linux EXT3/4 file system.

Step 2:

Perform the following actions to force the system to start in USB Recovery Mode:

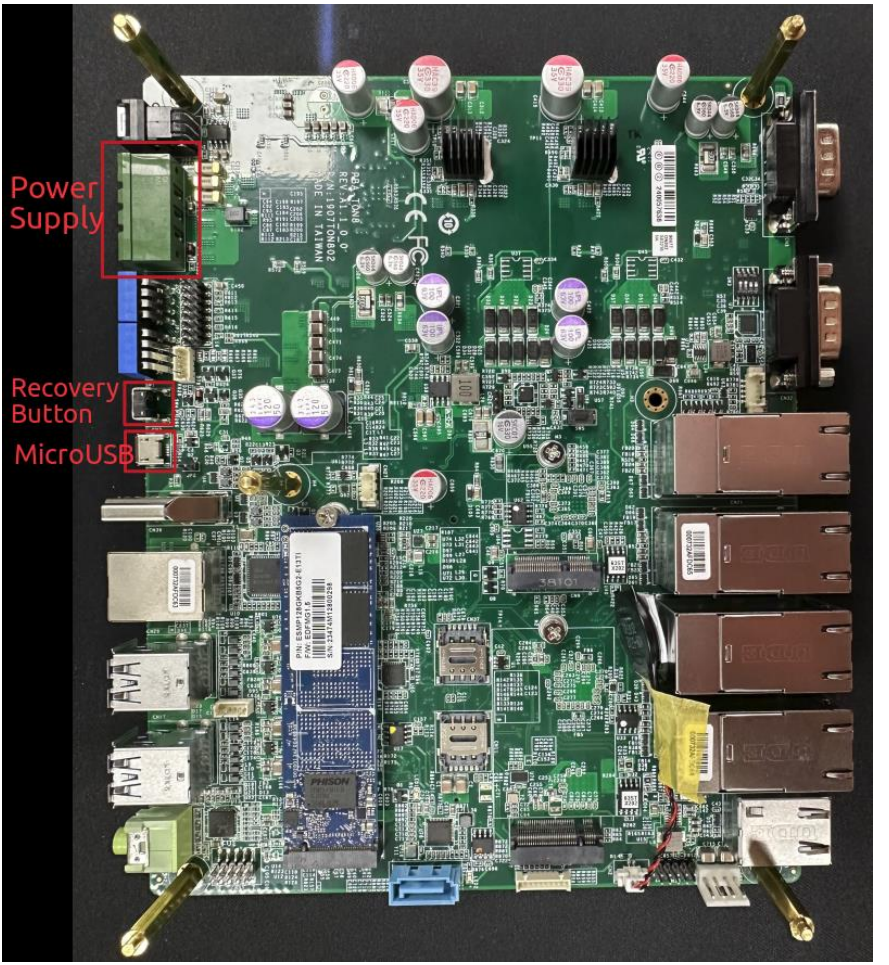
1. Connect the Micro-USB plug on the USB cable to the Recovery Port on the BOXER-8658AI, and the other end to an available USB port on the Host PC.
2. Connect the BOXER-8658AI to a power supply.
3. Press and hold the recovery key button. While holding the recovery key button, power on the system, and continue to hold the recovery key button for two seconds, then release. The BOXER-8658AI should then enter recovery mode.
4. To check if device is in recovery mode, enter the lsusb command in terminal on the host PC.

```
$ lsusb | grep "0955:7523"
```

If successful, the command will return "0955:7523 Nvidia Corp"

```
Bus 001 Device 018: ID 0955:7523 NVidia Corp.
```

Note: Recovery mode cannot be initiated if the NVIDIA Jetson Orin NX module is disassembled. Ensure the NVIDIA Jetson Orin NX module is installed and refer to the image below to perform the force recovery mode steps:



## 3.3 Flash Image to Board

Use the following steps to flash the OS to the BOXER-8658AI.

1) Open terminal on the Ubuntu Host PC, then access the folder you extracted in the previous section.

2) Enter the following command in terminal to flash the image:

```
$ ./flashboxer -s 62517420 nvme
```

3) Wait as the image is installed. Once complete you should see the following:


4) After Steps 2 and 3, mass-flash image is built up internally, so you can flash up to 10 targets at once by using the following command:

```
$ ./flashboxer -m nvme
```

## 3.4 Check BSP Version

Once the flash image is successfully installed, the BOXER-8658AI will reboot automatically, then check the BSP version to see if the system is flashing the correct version of BSP.

Open a Terminal, and type command "cat /proc/product"

You will see the product name with version and date

BOXER-8658AI_J5.1.2_A00_1.0.2_20231110

The version name will follow the format of:

{PJ_IF}_{JPV_IF}_A00_{IMGV_IF}_{BD_IF}

For example:

BOXER-8658AI_J5.1.2_A00_1.0.2_20231110

Note: File name may differ from this example.

{PJ_IF} is Project Information; e.g. BOXER-8658AI

{JPV_IF} is Jetpack Version; e.g. J5.1.2

{IMGV_IF} is Build Version; e.g. 1.0.2

{BD_IF} is Build Date; e.g. 20231110

# Chapter 4

OS User Guide

## 4.1 Introduction

The BOXER-8658AI's OS, Ubuntu/Linux version, and preinstalled SDK components are as follows:

For Jetpack 5.1.2 (l4t 35.4.1)

1. Ubuntu/Linux version
    a. Ubuntu version: 20.04.6
    b. Kernel version: 5.10.120-tegra
    c. UEFI version: 4.1-33958178
2. Built-in all Jetson SDK Components
    a. CUDA Toolkit for L4T 11.4.19
    b. cuDNN 8.6.0
    c. TensorRT 8.5.2
    d. OpenCV 4.5.4
    e. VPI 2.3
    f. NVIDIA Container Runtime 2.11
    g. Multimedia API 35.4
    h. Nsight Systems 2023.2
    i. Nsight Graphics 2023.2
    j. Nsight Compute 2022.2
    k. Nsight DL Designer 2022.2
    l. Deepstream 6.3
3. Built-in Allxon DMS
    a. Please refer https://www.allxon.com/solutions

Default login user/password is:

Account: aaeon

Password: aaeon

## 4.2 Update Note

Running **$ sudo apt upgrade** command in terminal will overwrite the **Aaeon kernel device tree(.dtb)/kernel image(Image)/bootloader** in the OS, which can lead to unexpected results, including the loss of I/O ports. To prevent this, AAEON disables the NVIDIA apt repository by default for updating NVIDIA apt packages.

AAEON maintains updated versions of BSP on the product page, which follow updates to the NVIDIA Jetpack software. Contact your AAEON representative or visit the product page to download the latest version of Aaeon BSP for your system: https://www.aaeon.com/en/

## 4.3 Power Mode for BOXER-8658AI

NVIDIA Jetson Orin NX power mode can be selected and monitored by GUI, please refer to the following image:


**Note**: Power mode is dependent on DRAM size. For more detailed information please visit: https://developer.nvidia.com/embedded/jetson-modules

## 4.4 DIO/GPIO Setting Command for BOXER-8658AI

1. GPIO test command:

Please refer to HW DIO/GPIO section for PIN Number and GPIO ID mapping. Take "PIN 6 <-> GPIO ID:PQ.05" as an example on JetPack 5.1.2:

```
# Export PQ.05
$ echo PQ.05 > /sys/class/gpio/export

# Set GPIO direction to output mode
$ echo "out" > /sys/class/gpio/PQ.05/direction

# Set the output value
# high
$ echo 1 > /sys/class/gpio/PQ.05/value

# low
$ echo 0 > /sys/class/gpio/PQ.05/value

# Set GPIO direction to input mode
$ echo "in" > /sys/class/gpio/PQ.05/direction

# Read the input value of GPIO
$ cat /sys/class/gpio/PQ.05/value

# Unexport PQ.05
$ echo PQ.05 > /sys/class/gpio/unexport
```

2 FAN PWM control command:

### Stop NV fan control daemon

$ sudo systemctl stop nvfancontrol

### Set PWM value

$ echo [PWM_duty_cycle] >

/sys/devices/platform/pwm-fan/hwmon/hwmon<x>/pwm1

* Where:

[PWM_duty_cycle] is a value in the range [0, 255].

<x> is a kernel enumerated number for fan hwmon.